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ORIGINAL ARTICLE

Categorisation of goals set using Goal Attainment Scaling for treatment of leg spasticity: a multicentre analysis

Stephen Ashford[a,b], Heather Williams[a], Ajoy Nair[c], Samantha Orridge[d] and Lynne Turner-Stokes[a,b]

[a]Regional Hyper-acute Rehabilitation Unit, Northwick Park Hospital, London, UK; [b]Department of Palliative Care, Policy and Rehabilitation, Florence Nightingale Faculty of Nursing, Midwifery & Palliative Care, King's College London, London, UK; [c]Alderbourne Rehabilitation Unit, Hillingdon Hospital, London, UK; [d]Kings College Hospital, London, UK

ABSTRACT

Background: Goal-classification of person-centred goals, using Goal Attainment Scaling for leg spasticity treatment.

Methods: The study was conducted in two phases: phase I, a retrospective review to evaluate categories of goal set in routine clinical practice. Findings were used to design a goal classification system. Phase II, a multi-centre study to confirm the goal categories. Goals set ($n = 270$) were analysed from data collected at three centres in the UK (one centre for phase I). Goal categories were mapped onto the domains of the World Health Organisation, International Classification of Functioning Disability and Health.

Results: One hundred and twenty seven participants were recruited in two cohorts: phase I: 63; phase II: 64. Goal categories using both cohorts were assigned to two domains, each subdivided into three key goal categories: *Domain 1*: body structure impairment 121 (44%): (a) pain/discomfort 34 (12%), (b) involuntary movements 20 (7%), and (c) range of movement/contracture prevention 67 (25%). *Domain 2*: activity function 149 (56%): (a) passive function (ease of caring for the affected limb) $n = 89$ (33%), (b) active function (transfers) 26 (10%), and (c) active function (mobility) 27 (10%), other $n = 7$ (3%).

Conclusions: Patients individual leg spasticity goals can be grouped into six categories and two domains, which will assist clinicians, patients and cares in setting and evaluating goals in practice.

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Goal setting; categorisation; activities; lower limb; muscle spasticity; standardising goals

➤ IMPLICATIONS FOR REHABILITATION

- Six goal areas used in clinical goal setting for leg spasticity management were identified, under the two domains: (1) body structure impairment: pain, involuntary movements, and range of movement and (2) activities/function: passive function (ease of caring), active function – transfers or standing and active function – mobility.
- Categorisation of goals is consistent on repeated evaluation and across different clinical services.
- Using clinical goals for leg spasticity treatment is an effective method to identify treatment priorities.

Introduction

Spasticity is a common and distressing consequence of acquired brain injury, which interferes with leg movement and limits functional tasks such as mobility and transfers, as well as increasing the burden on caregivers assisting people with personal care [1]. Goals for treatment of leg spasticity often focus on improvements in walking, standing, and transferring from different seated positions. However, depending on patient priorities for treatment and individual aspirations, variation is seen in the focus of goals for intervention.

Setting goals with patients and carers has become an integral activity in clinical rehabilitation [2,3]. Goal Attainment Scaling is a method of goal setting and scoring the extent to which a patient's individual goals are achieved in the course of intervention, so that diverse outcomes may be captured on a single tool. Originally described by Kiresuk and Sherman [4], Goal Attainment Scaling has been used in many areas of practice that warrant an individualised approach to outcome evaluation following complex interventions, including rehabilitation [5,6].

Patients are more likely to engage positively in rehabilitation directed towards goals that are important to them [3], and it has been suggested that the Goal Attainment Scaling process may provide an additional therapeutic benefit by encouraging patients to strive towards their goals [7]. Goal Attainment Scaling also provides a structure for the discussion and agreement of goals and expected levels of achievement with patients, their family and the clinical team [5].

Despite adaptations, such as Goal Attainment Scaling-light model [8] to make Goal Attainment Scaling simple to apply in clinical settings, its uptake for routine clinical practice continues to be constrained by the perceived time-consuming nature of individualised goal setting. Concerns have also been raised about lack of standardisation, which limits the comparability of Goal Attainment Scaling across different populations and settings [9,10]. Goal Attainment Scaling is not, in fact, a measure of outcome *per se*, but a measure of the achievement of treatment intentions and goal attainment. Therefore, it should not be used in isolation, but in conjunction with standardised measures to quantify the domains of goal achievement [11].

CONTACT Stephen Ashford stephen.ashford@nhs.net Regional Hyper-acute Rehabilitation Unit, Northwick Park Hospital, Watford Road, Harrow, Middlesex HA1 3UJ, UK

Opponents of Goal Attainment Scaling argue that the aggregation of qualitatively different goals into a single overall score is tantamount to combining apples with pears. However, a counter argument to this criticism of Goal Attainment Scaling is that while it may combine "apples" with "pears", these are both types of fruit (i.e., goals) and therefore may be linked by the higher order construct of "goal attainment".

The Goal Attainment Scaling approach has therefore been used as an individualised outcome evaluation tool in clinical studies of spasticity intervention [11–15]. The treatment of upper limb spasticity with botulinum neurotoxin is an example of a complex intervention where Goal Attainment Scaling has been used to demonstrate the benefits of treatment in this context [11–14,16]. In fact, Goal Attainment Scaling is now recommended in national and international guidelines as a method of recording person-centred outcomes in this context [17,18]. However, the goals for treatment are by nature widely diverse, crossing many domains of the World Health Organisation International Classification for Functioning Disability and Health [19]. This has led to a plethora of outcome measures used to capture them, which in turn confounds the assimilation of evidence to establish the effectiveness of treatment and comparability between studies.

While there is value in the individual nature of Goal Attainment Scaling goals, the ability to identify consistent goal categories is potentially valuable in understanding outcome for whole groups of patients, planning treatment interventions and in identifying which interventions might work best for improved outcomes in certain groups of patients. Following initial concerns about lack of standardisation [20], work in arm spasticity management has demonstrated that person-centred goals can be categorised consistently into six main goal areas [21,22]. This has led to the development of a structured approach combining individualised goal setting with standardised measures targeted on the patients priority goals for treatment [21] to make outcome measurement more comparable.

Work to categorise goals in leg spasticity has not yet been undertaken and this study aimed to identify, categorise and map goals for spasticity intervention in the leg according to the World Health Organisation International Classification of Functioning Disability and Health [23], mirroring work previously undertaken for arm spasticity.

Methods

This study had two phases.

Phase I was a retrospective review of goals set for focal leg spasticity intervention following botulinum toxin injection and physical management between January 2009 and January 2013. The setting was a regional specialised rehabilitation service (United Kingdom – Rehabilitation Outcomes Collaborative; designated hyper-acute and level 1) [24], with associated outreach and spasticity service. All patients receiving botulinum toxin injection for leg spasticity were included in the analysis and selection for treatment was undertaken based on clinical need.

Phase II was a prospective consecutive cohort evaluation of goal setting at three sites, including both botulinum toxin injection and physical management methods between November 2014 and June 2016. Inclusion in the cohort study was based on a clinically identified need for spasticity management (including botulinum toxin injection) as part of a rehabilitation programme. Sites were chosen purposively to reflect the range/types of specialist spasticity services available in the UK, but applicable more widely. The settings were:

1. An academic regional rehabilitation service, with associated outreach (to other rehabilitation units, community and referring hospitals) and spasticity service.
2. A local specialist rehabilitation service with associated spasticity clinic.
3. A regional spasticity service based at a tertiary hospital.

The services represent the current range of services offering spasticity management in the context of rehabilitation in the UK.

Ethics

Ethical approval for the study was granted by the National Research Ethics Service Committee London – South East (14/LO/1340). Informed consent procedures or consultation with next of kin, prior to participation in phase II of this study was undertaken with all participants in accordance with the ethical approval.

Recruitment

Phase I was a retrospective review of routinely collected data in a cohort receiving spasticity management intervention. Data were prospectively collected at the time of intervention and entered into an electronic database designed for capture of routine data.

Phase II participants were recruited in a prospective cohort study including goal setting prior to focal spasticity intervention (botulinum toxin administration and physical management) according to clinically identified need.

Goal setting procedure

A consistent goal setting procedure was used across phases I and II. Goals were set according to the "Goal Attainment Scaling-Light" methodology as described by Turner-Stokes [8], based on the original method of Kiresuk and Sherman [4]. In summary, goals are identified to suit the individual and agreed by both the patient (or their carer, if they are unable to participate) and the treating team prior to starting treatment. Tightly defined goal definitions are drawn up to be specific, measurable, achievable, realistic and timed. The expected (predicted) level of outcome is recorded. A five-point scale ranging from -2 to $+2$ is used to evaluate outcome using a verbal rating scale which is then assigned the numeric ratings for calculation. A score of "0" reflects achievement of the goal as expected, positive scores indicating achievement at higher levels, and negative scores at lower levels than expected. Typically, there is more than one goal for treatment and their scores combined using a standard formula to derive a *T*-score reflecting overall achievement of the predicted outcome following assignment of the scores from the verbal rating in Goal Attainment Scaling-Light.

Data collection

A standardised recording proforma (within an electronic database) was used in the phase I retrospective cohort. In phase II, a further development of the original proforma was used to simplify data collection. In the phase II, prospective cohort, goal achievement and any parameters or standardised measures used to provide quantification for goal evaluation (e.g., 10 metre timed walk) were collected.

Table 1. Combined proportion of goals set in the identified categories from phases I and II.

Goal domain (270 goals)	Goal categories	*Combined analysis from: Phase I $n = 63$ patients (125 goals) Phase II $n = 64$ patients (145 goals) No. of goals set	% of goals set
Body structure Impairment *121 goals (45%)	Pain	34	12%
	Involuntary movements	20	7%
	Contracture prevention and range of movement	67	25%
Activities *149 goals (55%)	Passive function	89	33%
	Active function Transfers	26	10%
	Active function Mobility	27	10%
	Other; therapy facilitation and cosmesis – body perception	7	3%

Data analysis

Goal statements were extracted, classified to determine goal categories in phase I. Classification of goals was completed by two authors (LTS and SA) independently and then compared, with any differences discussed and consensus reached. For classification, "like goals" were initially grouped to identify the categories which were based of frequency of goal type occurrence in the dataset. The goal categories developed in phase I were then applied to phase II confirming the classification structure. Goal categories were then mapped onto the World Health Organisation International Classification of Functioning Disability and Health [23], to enable comparison to other current and future work internationally in this area. Mapping onto the ICF used the illustration library from the International University of Health and Welfare, Japan [25]. The illustration library allows the clear identification of domains and sub-classifications, once the core goal parameter has been identified. Mapping was undertaken independently by the first author and reviewed by the other authors for agreement.

Results

In phase I, 195 patients assessed for spasticity management; of which, 63 received botulinum toxin injection for leg muscle spasticity and combined physical interventions and were included as participants in the retrospective cohort. The mean age was 56 (standard deviation 16.7), 29 (47%) male. The diagnoses were stroke ($n = 27$), traumatic brain injury ($n = 11$), hypoxic brain injury ($n = 5$), multiple sclerosis ($n = 16$), complex regional pain syndrome ($n = 1$), spinal cord injury ($n = 1$), or missing ($n = 2$).

In phase II, 65 participants consented, one patient refused clinical intervention or assessment and was excluded, 64 participants were therefore included in the prospective cohort. Mean age was 51 (standard deviation 17.4), 32 (50%) male. The diagnoses were stroke ($n = 34$), traumatic brain injury ($n = 10$), hypoxic brain injury ($n = 5$), multiple sclerosis ($n = 8$), brain tumour ($n = 6$), or spinal cord injury ($n = 1$).

In phase II, median (interquartile range) EQ-5D (health related quality of life scale; range 0–100) was 60 (43.7–80), indicating a substantial impact on quality of life. The Rivermead Mobility Index was 1 (0–7.7) indicating marked functional impairment and reduced mobility. Modified Ashworth Scale composite score (a summed score was produced for hip, knee and ankle) was 13 (8–18) indicating severe spasticity in this group. These data were not available in phase I.

In phases I and II, we acknowledge the small numbers in the diagnostic group of spinal cord injury, however the focus in this work is goal setting for management of a symptom (spasticity) within a rehabilitation programme. Therefore, relevance to spasticity within rehabilitation is the priority, rather than the diagnostic category, and these subjects were therefore retained for analysis.

In total, 270 individualised goals for treatment of leg spasticity following botulinum toxin injection and physical rehabilitation were analysed. In phase I, 62 participants had two goals (one participant had a single goal) and in phase II the number of goals ranged between 2 and 4, with 49 (75%) having two goals. Goal classification is summarised in Table 1.

A list of percentage goal achievement, parameters, or standardised measures used to quantify goal outcome identified in each goal area during phase II are presented in Table 2. This information was not routinely collected in phase I.

Following goal categorisation by the two independent authors, mapping onto the World Health Organisation International Classification of Functioning Disability and Health was performed (see Table 3).

Discussion

In this evaluation, goal categories could be assigned to two domains, each subdivided into three key goal areas: domain 1 body structure impairment: pain/discomfort, involuntary movements, range of movement/contracture prevention. Domain 2 activity function: passive function (ease of caring for the affected limb), active function (transfers), and active function (mobility). In addition, a small number of goals were also identified for therapy facilitation and cosmetic appearance of the leg.

The findings have been used to inform the development of a structured approach to goal setting; Goal Attainment Scaling – Leg, which is a structured process for applying Goal Attainment Scaling alongside recording of standardised measures and available from: https://www.kcl.ac.uk/nursing/departments/cicelysaunders/attachments/GASlegs-V2–4.pdf. The Goal Attainment Scaling – leg should help patients, carers and clinicians establish agreed goals and facilitate outcome assessment in a manner supportive of the rehabilitation programme.

This evaluation demonstrated that the leg impairment and passive function categories are broadly similar to those identified in earlier work classifying goals in arm spasticity [21]. The exception was active function, which is divided into transfers and walking for the leg. Though the categories of goals set in the arm and the leg are similar for spasticity management, the proportions of goals set in different categories were different. Prospective comparison of this within the same cohort would be valuable to determining likely goal setting priorities and achievement rates to patients in clinical practice to aid care planning in the future.

In this analysis of goals set for management of leg spasticity with in a rehabilitation context, a number of standardised measures were applied alongside goal setting for evaluation of outcome (see Table 2). There was a degree of consistency in this study, with which measures were applied for the different categories of goal.

Table 2. Breakdown of goals set (145) and standard measures used in each goal area in phase II.

Goal domain	Goal area	No. of goals set (% of total)	No. of goals achieved (% of category)	Goal parameters/standard measures used[a]
Body structure impairment 76 goals (52%)	Spasticity-related pain or discomfort	24 (17%)	16 (67%)	Numerical Rating Scale ($n = 22$)
	Involuntary movements during activities or care (associated reactions) or spasms	17 (11%)	10 (58%)	Spasm frequency ($n = 5$)
	Range of movement, prevention of contractures/deformity, splint tolerance	35 (25%)	24 (69%)	Goniometry, anatomical distances (e.g., inter-knee distance) ($n = 8$), splint tolerance times ($n = 20$)
Activities 69 goals (48%)	Passive function – ease of caring for the affected limb (e.g., maintaining hygiene, skin integrity, dressing the limb)	38 (26%)	29 (76%)	Ease of care or carer burden ratings (10-point numerical rating) ($n = 33$), time to complete task, ($n = 4$) Leg Activity measure – passive function ($n = 34$)
	Active function – transfers or standing using the limb in an active function task	11 (7%)	9 (81%)	Ability to complete the defined task ($n = 4$), time taken ($n = 3$), control/quality of movement ($n = 2$) Leg Activity measure – active function ($n = 9$)
	Active function – improved mobility (e.g., walking, avoiding falls)	15 (10%)	9 (59%)	Gait speed (10 metre walk, 6 minute walk), endurance (6 minute walk), video, falls frequency, confidence rating (10-point numerical rating) ($n = 7$) Leg Activity measure – active function ($n = 13$)
	Other, therapy facilitation and cosmesis – perception of body image	5 (4%)	3 (60%)	Three of these were for the facilitation of therapy and none included a standardised measure or goal parameter
	Total	145 (100%)	100 (69%)[b]	

[a]All standardised measures or ordinal scales used to quantify goal attainment are indicated.
[b]Percentage of 145 total.

Table 3. Mapping of goal categories onto the relevant World Health Organisation International Classification of Function Disability and Health codes.

Domain	Goal area	Chapter	Primary ICF code	Associated ICF codes
Body structure and function				
	Pain	2 – Sensory & pain	b280 – Pain	b735
	Passive range of movement	7 – Neuro-musculoskeletal	b735 – Muscle tone	b710
	Reducing associated reactions	7 – Neuro-musculoskeletal	b755 – Involuntary movement reactions to position/balance	b735
Activity and participation				
	Maintaining postures	4 – Mobility	d415 – Maintaining body position	d445
	Improved walking/gait pattern	4 – Mobility	d450 – Walking	d420
	Transferring	4 – Mobility	d420 – Transferring	d410, d415
	Changing position	4 – Mobility	d410 – Changing body position	d415, d420
	General Independence	5 – Self care	d500 – General Independence	b510-washing
	Hygiene/skin integrity	5 – Self care	d520 – Caring for body parts	b735, b710, b510
	Caring for the leg	5 – Self care	d520 – Caring for body parts	b735, b710, b510
	Dressing	5 – Self care	d540 – Dressing	d440, b735, d710

ICF: International Classification of Functioning Disability and Health.

In domain 1 (body structure impairment): pain or discomfort was measured by a 10-point Numerical Rating Scale; involuntary movements were evaluated using spasm frequency count; range of movement was evaluated by goniometry or an another anatomical measurement (e.g., inter-knee distance) and contracture prevention by splint application length of time. In domain 2 (activity): passive function (ease of caring for the affected limb), the measures used were more varied, but included, ease of care rating on a 10-point numeric scale, the Leg Activity measure [26] and time to complete a care task. The active function-transfers category was evaluated by ability or time taken to complete the "transfer" or Leg Activity measure. The active function-mobility category was evaluated by timed walk (10 meter or 6 meter), walking endurance (6 min walk), falls frequency, video recording, rating of confidence when walking (10-point numeric scale) and Leg Activity measure.

Measures were associated with the categories of goals set and often referred to in the goal statement as a measure of goal achievement. There was a degree of consistency in the use of measures per goal category, but it would be helpful to explore this further in a larger sample including practice at more centres.

The current evaluation has a number of limitations. First, the study was conducted in the UK health system and, has not been tested in other health systems. However, earlier work for arm spasticity identified a similar classification with data collected from a number of different countries [21], so conducting a similar study for leg spasticity should be possible in the future. Second, the data collection in phase I of this work was not done with the

same rigour as data collection in phase II. While the same categories were found in the domains of impairment and activity function there were some differences in the number of goals set and the proportions set under each category. Rigorous monitoring of the goal setting process seemed to address this issue in phase II. Some goals in both phases I and II contained potential multiple categories for which the primary category was used to classify the goal. In practice, this did not lead to disagreement and classification was generally clear, but could be considered a limitation. Third, while it was possible to classify most goals according to the World Health Organisation International Classification of Function Disability and Health, this was not so in every case. Those goals categorised as "other" were not possible to classify because they did not relate directly to body structure and function, activity or participation. This category contained a relatively small number of goals. Those related to therapy facilitation were likely to be working towards elements that could be classified as activity or participation, but not the goal statements as written.

This analysis supports the premise that, despite their diversity, goals for management of leg spasticity, as previously demonstrated in arm spasticity, can be broadly categorised. The approach of identifying the common goal areas and associated standardised measures used in conjunction with them, is not confined to the management of spasticity, but has the potential for wider application in rehabilitation. Use of standardised measures alongside goals was valuable in quantifying and measuring the outcome of the goals set and can be considered as an approach to evaluate goal related outcome in rehabilitation more widely.

Disclosure statement

The views expressed are those of the authors and not necessarily those of the NHS, the NIHR, the NIHR CLAHRC Northwest London or the Department for Health, UK. The authors report no other declarations of interest.

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ORCID

Stephen Ashford http://orcid.org/0000-0001-5541-7063

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